Economic Considerations in Water Quality Standards

Water Quality Standards Academy

Office of Science and Technology

Office of Water

U.S. Environmental Protection Agency

Where are Economics Considered in Water Quality Standards?

Objective of Clean Water Act

"…restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

Interim Goal (101(a) uses)

"…provide for the protection and propagation of fish, shellfish and recreation in and on the water, wherever attainable."

Implied

- Water quality should get progressively better.
- The benefits are worth the costs.

Objectives Of This Module

- Learn how economic impacts are considered in water quality standards.
- Review how potential economic impacts can be measured.
- Understand when relief from meeting water quality standards may be allowed.
- Relax – detailed guidance is available.
  - Interim Economic Guidance for Water Quality Standards (1995) http://www.epa.gov/waterscience/standards/econworkbook
  - Guidelines for Preparing Economic Analyses (2010) http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html
  - Call me at (202) 566-1335

Elements of Water Quality Standards Where Economics Are Considered?

Water Quality Standards

- Uses – an expression of the role of a water body in society.
- Criteria – measurable qualities of the water that support specific uses.

- Antidegradation policy – protect high quality water

Potential Economic Impacts May Be Considered When Designating Uses

- Rebuttable presumption – 101(a) uses are attainable unless demonstrated otherwise.
- Uses can be lowered or removed only if
  A. Not an existing use.
  B. Can demonstrate with a UAA that attaining the use is not feasible for at least one of the following six reasons (40 CFR131.10(g)):
     1. A pollutant is naturally occurring
     2. Flow is too low
     3. Remedy would cause more environmental damage to correct than leave in place
     4. Hydrologic modifications prevent attainment
     5. Natural physical conditions prevent attainment
     6. Result in substantial and widespread economic and social impacts

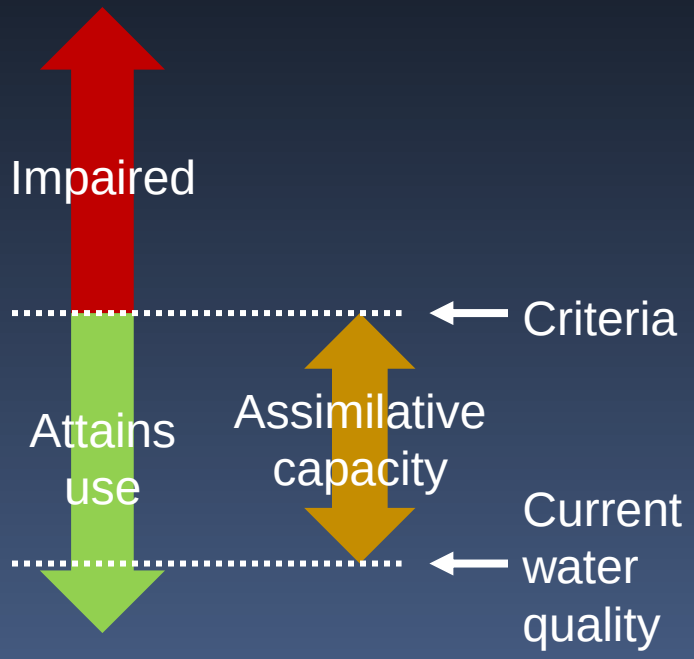
Potential Economic Impacts May Justify A Variance

- A temporary lowering or removal of a designated use.
- Preferable to changing the designated use
  - Applies to specific discharger.
  - Pollutant specific.
  - Defined duration.
  - Encourages compliance where feasible and in a reasonable time frame.
  - The same 131.10(g) factors apply when seeking a variance.

Potential Economic Impacts May Be Considered In Decisions to Lower Water Quality

Antidegradation policy (40 CFR 131.12)

- Prevents lowering water quality that is higher than needed to support uses.
- Only allowed if necessary to accommodate "important economic or social development."



Important economic or social development = Substantial and widespread economic and social impacts

Economic Impacts

Substantial: Discharger(s) unable to afford the necessary pollution reduction

Widespread: Significant adverse economic and social impacts to the surrounding community

Economic Analyses

Benefit-Cost Analysis

- Measure of economic efficiency to help determine if society is better off.
- Often expressed as a ratio of costs and benefits.

Equity Assessments

- Examines changes in distribution of income or wealth.
- Often used to assess impacts to subpopulations that are disadvantaged or experience disproportionate effects.

Economic Impact Analysis

- Examines who gains and who loses.
- Usually focuses on costs.

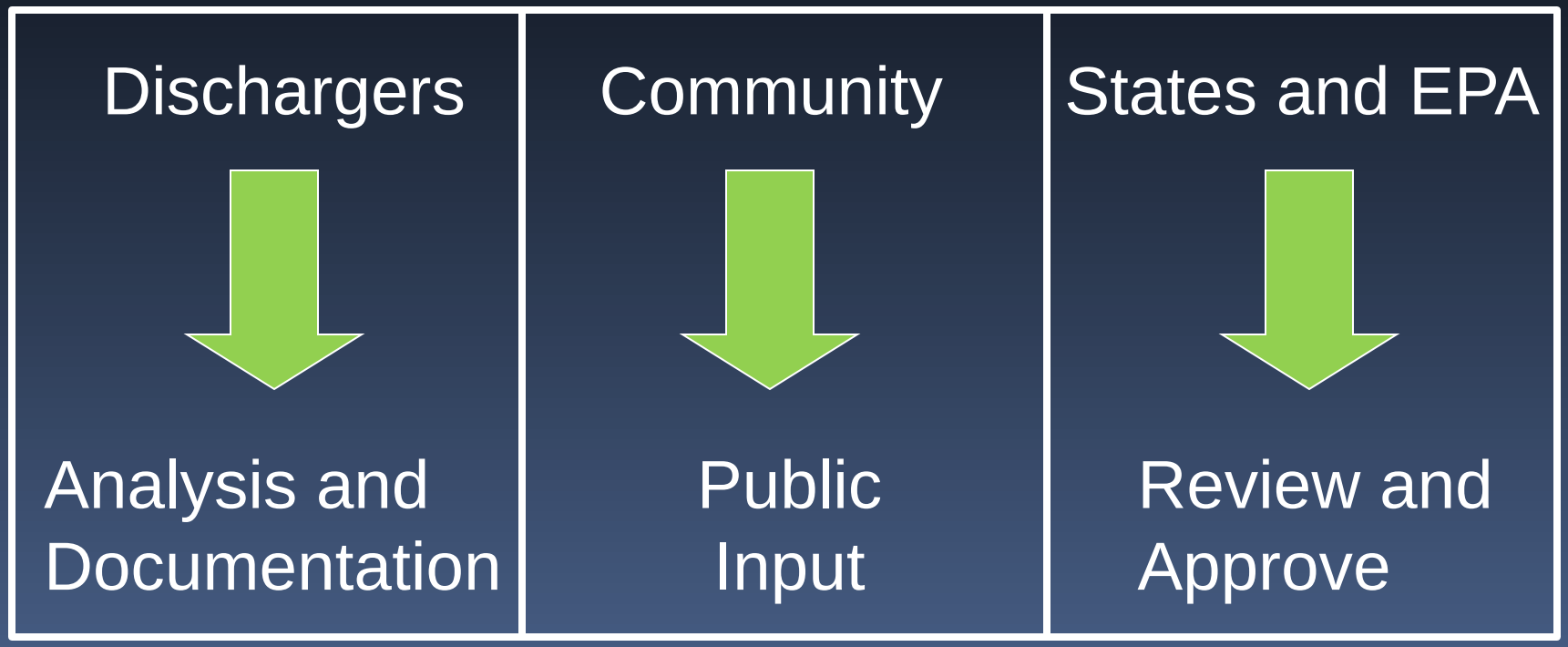
Pollution Sources

	Public	Private
Point source	Example: Sewage treatment facility	Example: Industrial facility
Non-point source	Example: Rural highway	Example: Golf course

Point vs. non-point → Pollution control approaches used

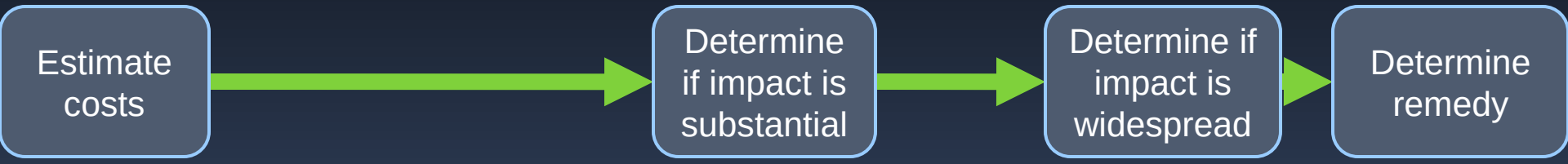
Public vs. private → Who pays the costs

Roles and Responsibilities

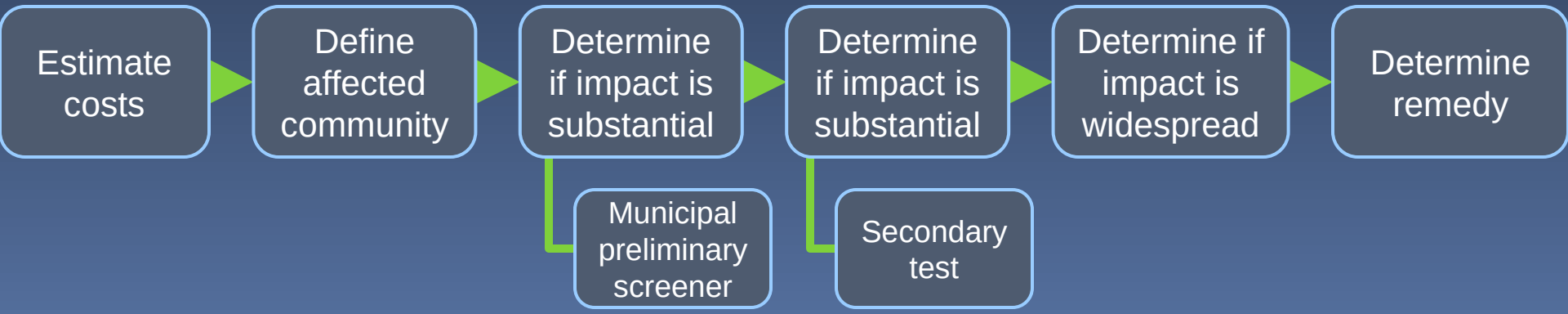


Steps in the Economic Impact Analysis

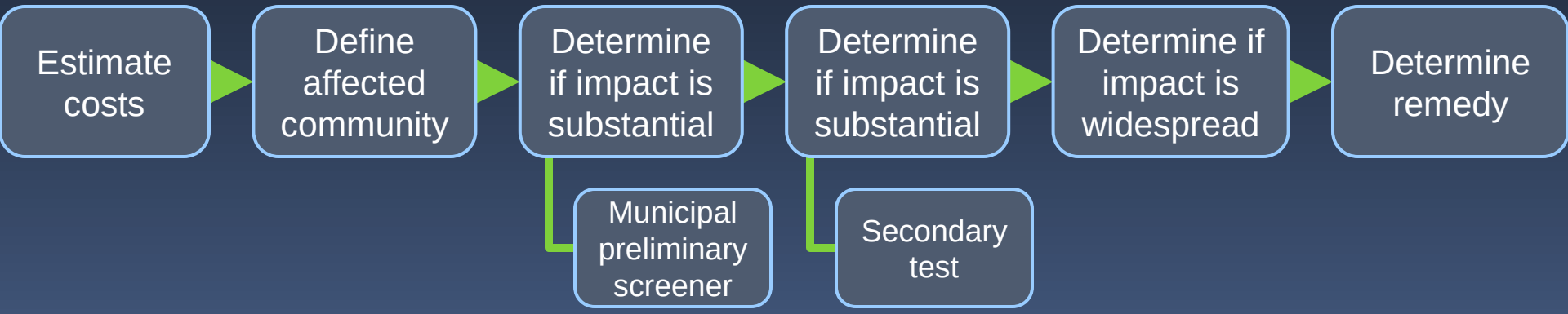
Private entities:

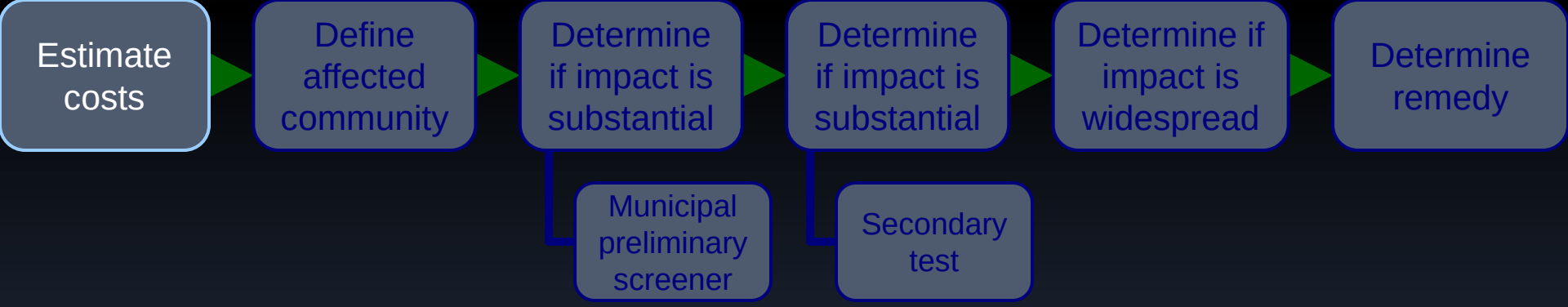


Public entities:



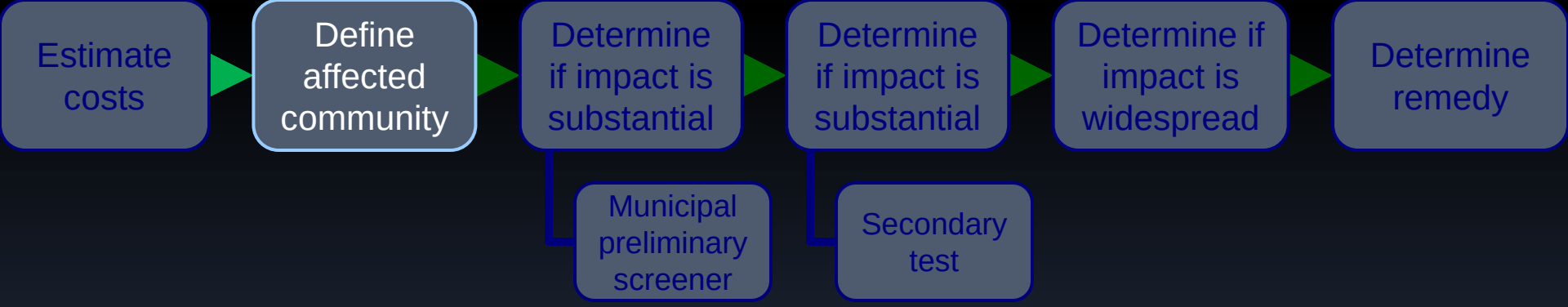
Public Entity
Economic Impact Analysis



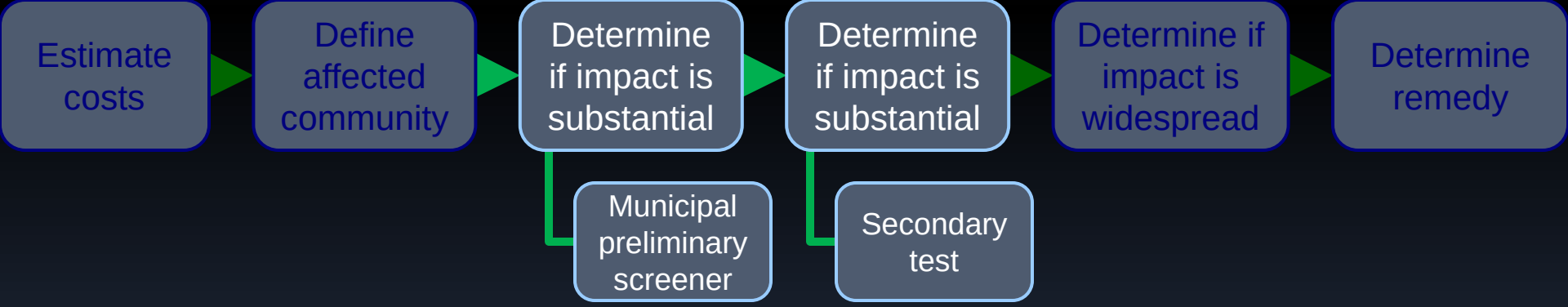


Project costs

- Estimates must be based on engineering analysis.
- Only controls needed to meet the standard (not increasing capacity or other improvements).
- Must consider a broad range and combination of cost-effective options.
- The EPA may request additional documentation if necessary.



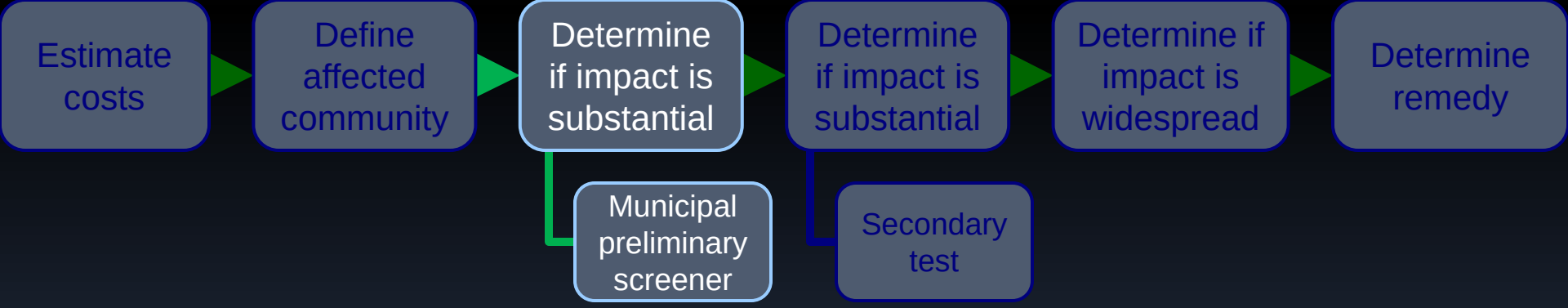
- Public entity analysis based on costs per household.
- Must determine who will actually pay (usually the governmental jurisdiction paying the compliance costs).
- Must determine proportion of costs borne by households
  - Surcharges to industrial facilities don't count
  - Different users may pay different proportion of costs.



Determination of substantial impacts for public entities is a two step process

1) Municipal preliminary screener → "First cut" assessment of ability to pay

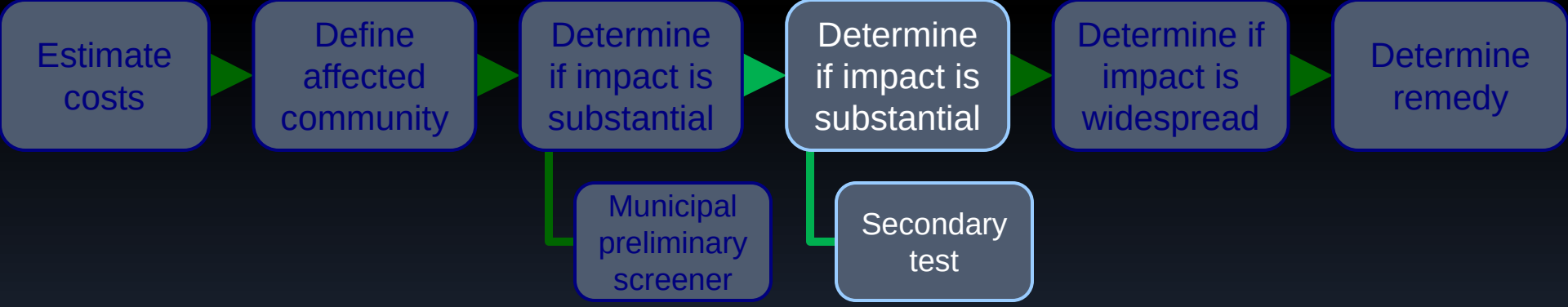
2) Secondary test → Detailed socioeconomic indicators



Municipal Preliminary Screener $=$ $\dfrac{\text{Average annualized cost per household*}}{\text{Median household income}}$

*Includes existing related pollution control costs

Municipal Preliminary Screener	< 1%	1%-2%	>2%
Economic impact	Weak	Mid-range	Strong
Continue to secondary test	No	Maybe	Yes



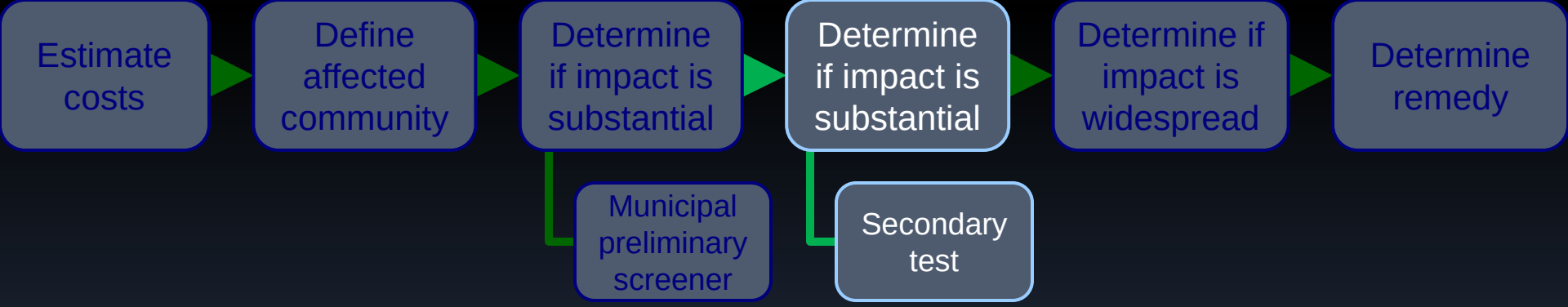
- Two debt indicators
- Two socioeconomic indicators
- Two financial management indicators
- Assign score for each indicator where:

Weak = 1

Mid-range = 2

Strong = 3

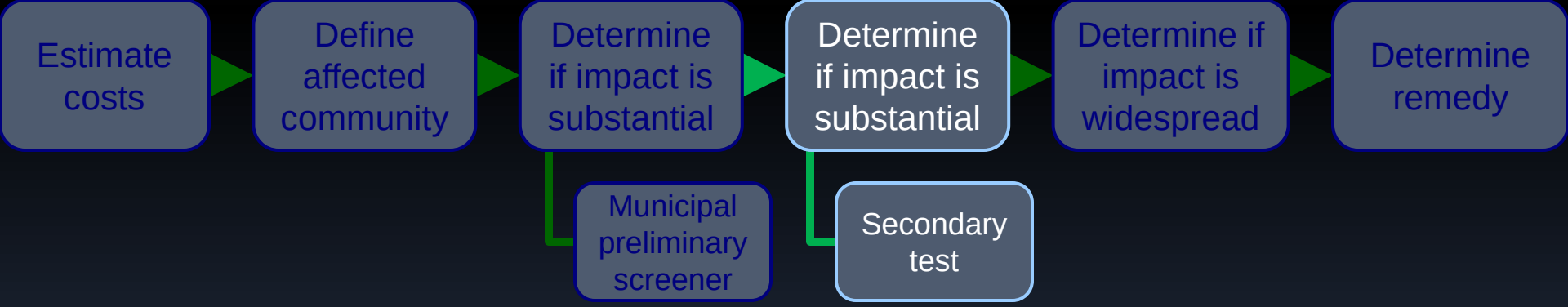
- Calculate average score.



Debt indicator 1:

Bond Rating
(credit worthiness of the community)

	Rating		
Indicator (S & P)	< BBB	BBB	> BBB
Indicator (Moody's)	< Baa	Baa	> Baa
Score	Weak = 1	Mid-range = 2	Strong = 3

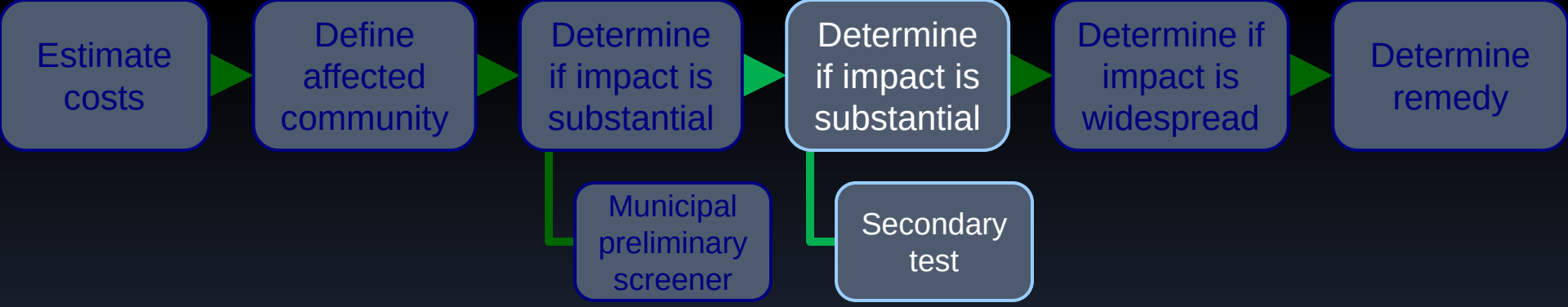


Debt indicator 2:

$$\frac{\text{Overall net debt}}{\text{Market value of taxable property}}$$

(debt burden on residents within the community)

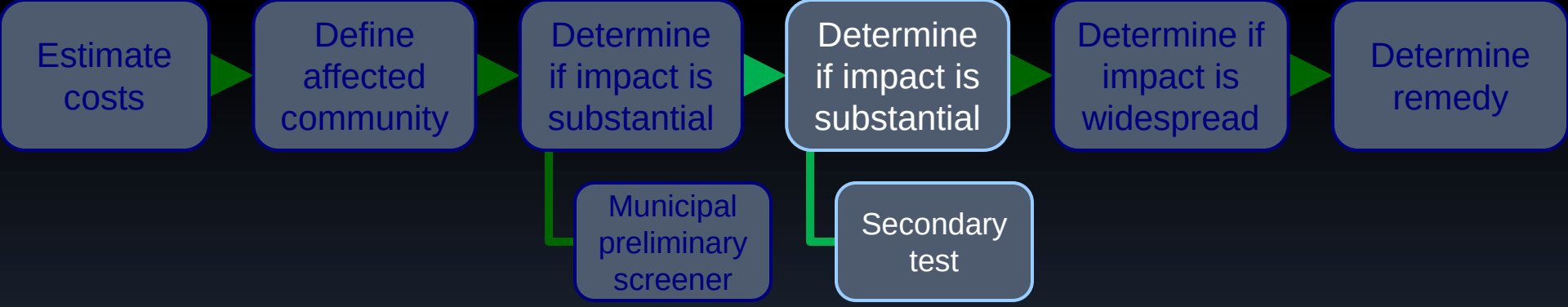
Indicator	> 5%	2% - 5%	< 2%
Score	Weak = 1	Mid-range = 2	Strong = 3



Socioeconomic indicator 1:

Unemployment rate
(general economic health of the community)

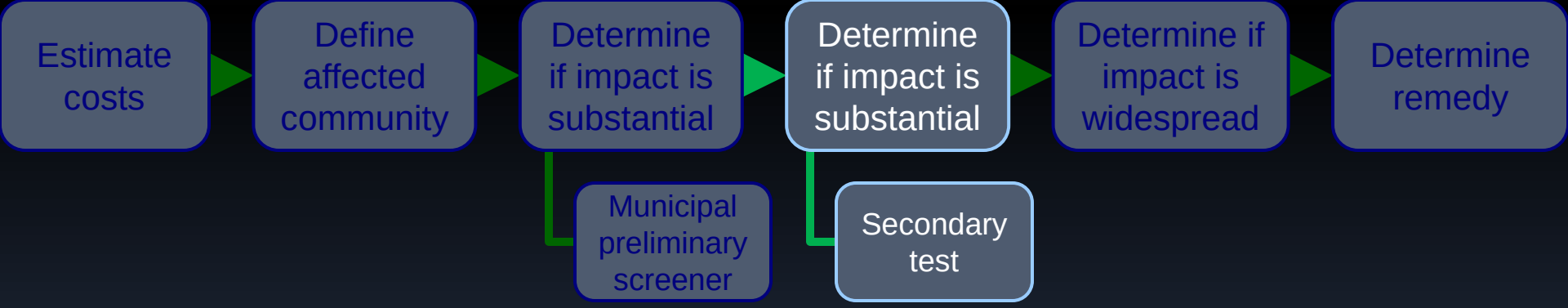
Indicator	Above state average	Near state average	Below state average
Score	Weak = 1	Mid-range = 2	Strong = 3



Socioeconomic indicator 2:

Median household income
(general indicator of community spending capacity)

Indicator	Less than 90% of State average	Between 90% and 110% of State average	Greater than 110% of State average
Score	Weak = 1	Mid-range = 2	Strong = 3

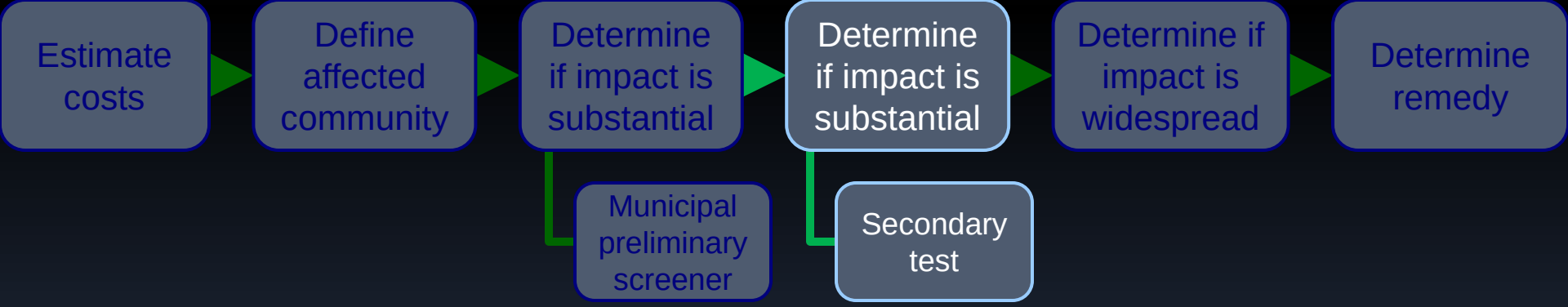


Financial management indicator 1:

$$\frac{\text{Property tax revenue}}{\text{Full market value of taxable property}}$$

(capacity to support additional debt on basis of community's wealth)

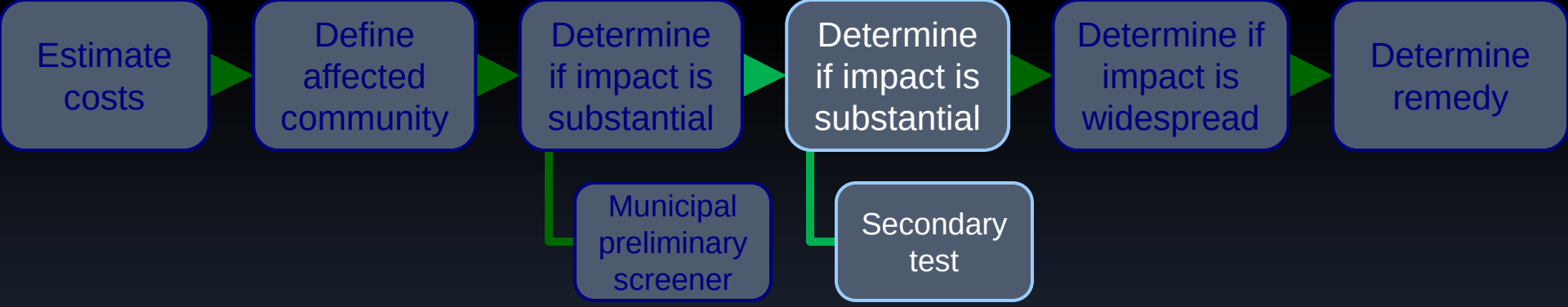
Indicator	> 4%	2 – 4%	< 2%
Score	Weak = 1	Mid-range = 2	Strong = 3



Financial management indicator 2:

Property tax collection rate
(how well local government is administered)

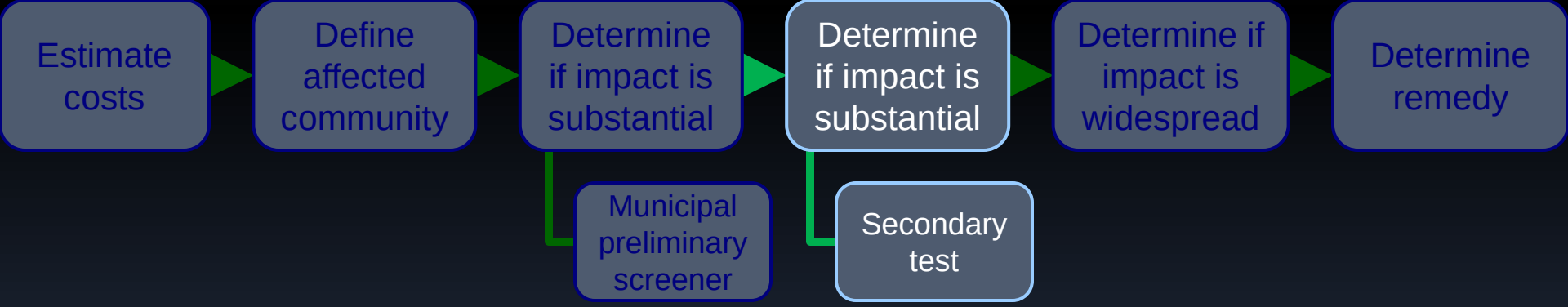
Indicator	< 94%	94% – 98%	> 98%
Score	Weak = 1	Mid-range = 2	Strong = 3



Calculate average secondary score

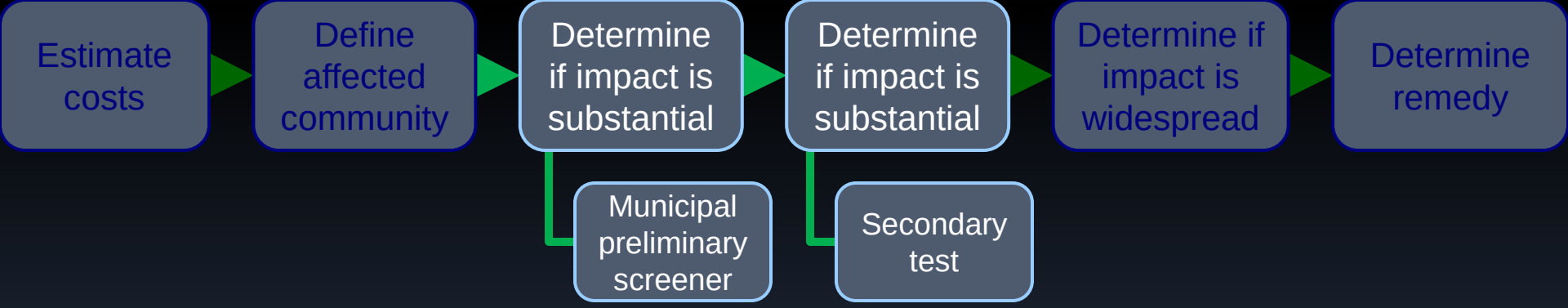
Example:

Debt indicator 1	2
Debt indicator 2	3
Socioeconomic indicator 1	3
Socioeconomic indicator 2	1
Financial management indicator 1	2
Financial management indicator 2	2
Average	2.2



Secondary test score assessment

Secondary test score	< 1.5	1.5 – 2.5	>2.5
Local economic conditions	Weak	Mid-range	Strong



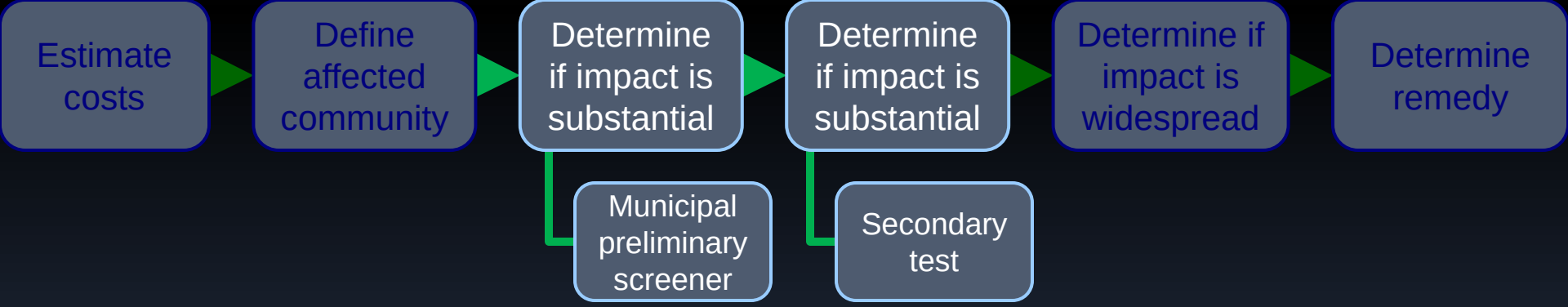
Substantial impact assessment matrix

Secondary test score	Municipal Preliminary Screener: > 2.0% (weak)	Municipal Preliminary Screener: 1.0% - 2.0% (mid-range)	Municipal Preliminary Screener: < 1.0% (strong)
< 1.5 (weak)	✓	✓	?
1.5 – 2.5 (mid-range)	✓	?	✗
> 2.5 (strong)	?	✗	✗

✓ = Substantial economic impact

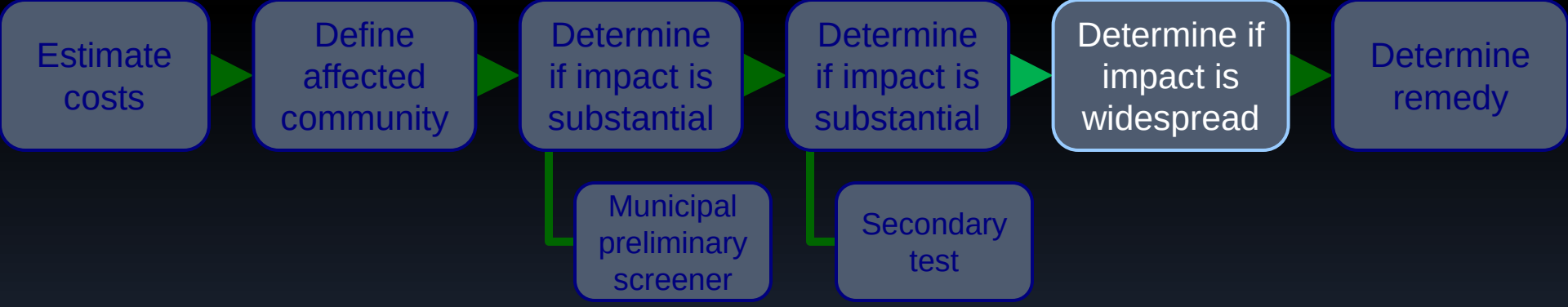
? = Possible substantial economic impact

✗ = No substantial economic impact



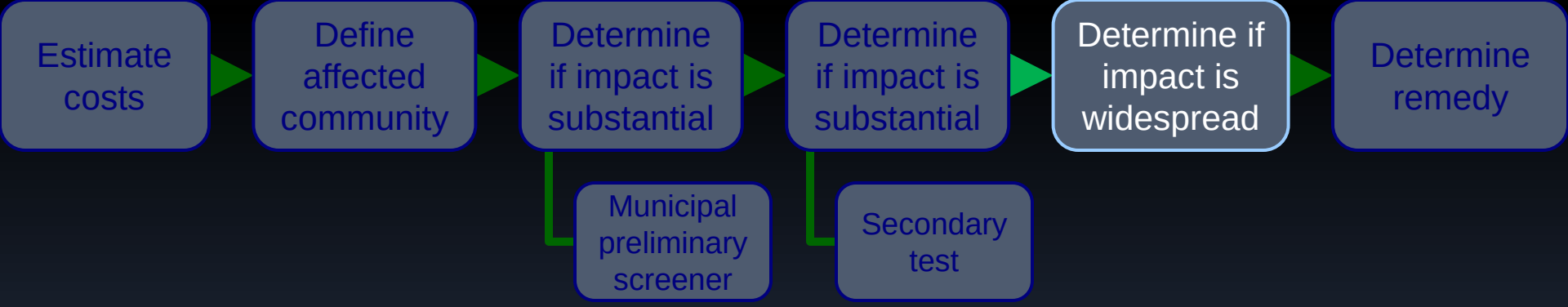
Common errors:

- MPS alone presented as evidence of substantial impacts.
- Incomplete analysis (e.g., “back-of-the-envelope” cost estimates, hypothetical control requirements, or overly conservative assumptions).
- Includes other costs in the MPS (e.g., drinking water rates).
- Alternative household income indicators (e.g., lowest quartile)
- Inconsistent year dollars.
- Use national statistics (e.g. national unemployment rate).
- Do not consider likely funding (e.g., government loans, grants, cost-sharing arrangements).



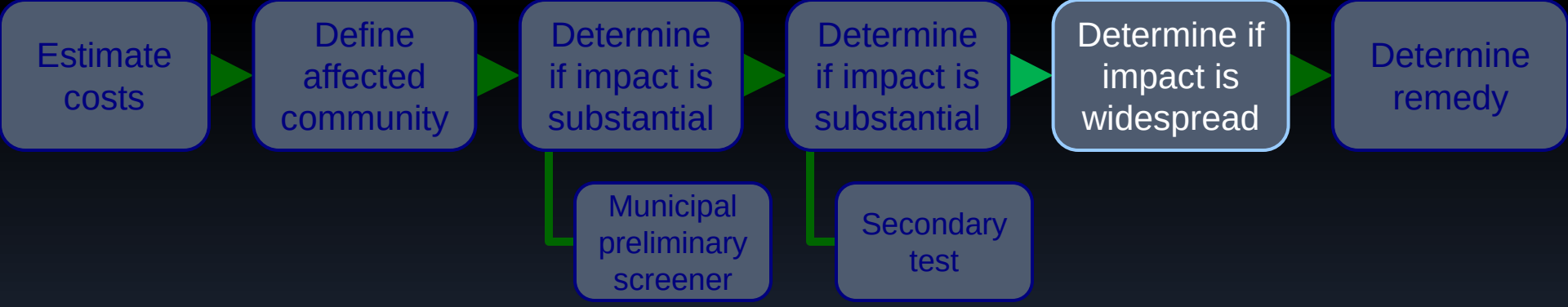
If economic impacts are substantial, it must also be demonstrated as widespread.

- No single standardized test.
- Relative changes of different socioeconomic indicators.
- Professional judgment required (subject to EPA review).



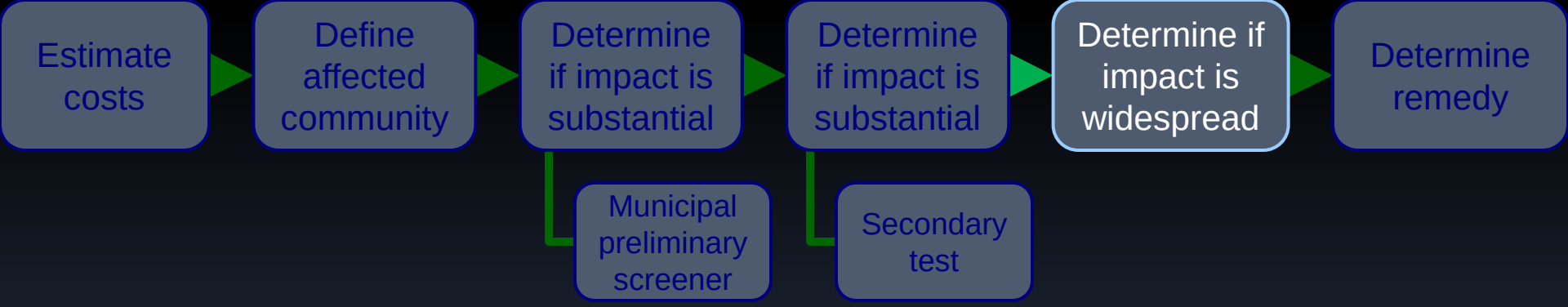
Three basic steps

1. Define the affected community.
2. Evaluate community's current socioeconomic characteristics.
3. Evaluate how the community’s characteristics would change.



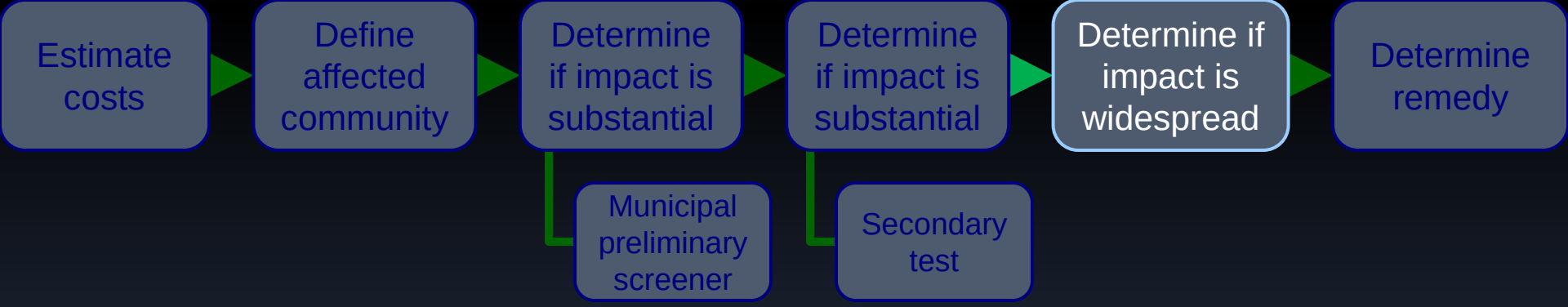
Sample of socioeconomic indicators

- Unemployment rate
- Median household income
- Ability of community to carry more debt
- Business activity
- Percent of households below poverty line
- Development potential
- Expenditures on social services
- Property values
- Tax revenues
- Sewer fees



Other methods

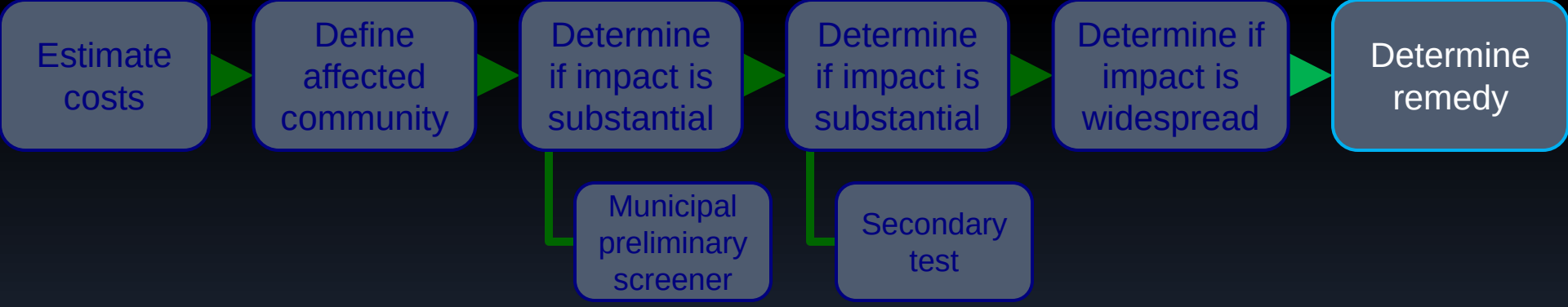
- Proprietary models that create detailed models of local economies (e.g. IMpact analysis for PLANning).
- Customized models for predicting change in regional income and employment (e.g. Great Lakes Initiative regional economic impact model).



Other considerations

- Nonpoint Sources
  - Meeting a standard may require agriculture and urban pollution controls.
  - Note critical differences between federally regulated and federally unregulated entities.

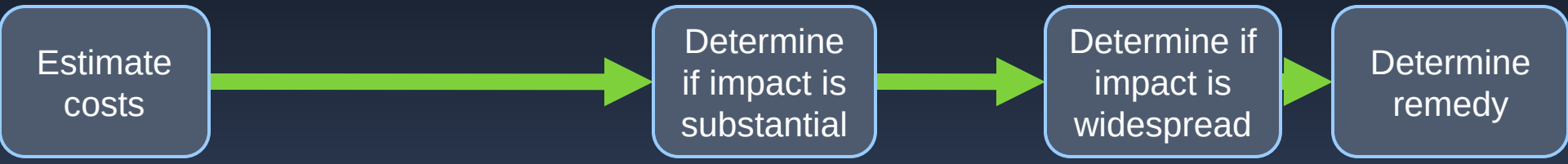
- Benefits
  - Reduction in benefits (e.g. opportunity costs) can be used to estimate overall social and economic impacts.
  - Not a benefit-cost analysis!



- If substantial and widespread economic impacts not demonstrated, entity must comply with the standard.
- If substantial and widespread economic impacts are demonstrated, entity must implement the most efficacious pollution control option that does not cause substantial and widespread impacts.

Private Entity
Economic impact Analysis

Private entities:



- Other financial indicators more appropriate for private entities.
- Reduced profit or closure not enough – must impact the community.
- Must be currently or potentially profitable (avoidance of adverse economic impacts).

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